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C07D-309/28; C07D-327/06; C07D-333/38; C07C-259/10;  
A01N-037/28; A01N-043/02; A01N-043/40; A01N-043/78

(19) (CA) APPLICATION FOR CANADIAN PATENT (12)

(54) N-Hydroxy-N-Phenylcarboxamides, Their Preparation and  
Compositions Containing Them for Controlling Harmful  
Fungi

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Ammermann, Eberhard - Germany (Federal Republic of) ;  
Lorenz, Gisela - Germany (Federal Republic of) ;

(71) Same as inventor

(30) (DE) P 42 31 518.2 1992/09/21

(57) 7 Claims

Notice: This application is as filed and may therefore contain an  
incomplete specification.



Industry Canada Industry Canada

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Canada

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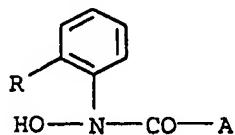
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N-Hydroxy-N-phenylcarboxamides, their manufacture, and agents containing them for combatting injurious fungi

5 ABSTRACT OF THE DISCLOSURE:

1. N-Hydroxy-N-phenylcarboxamides of the formula I

10



I

15

where:

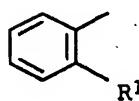
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R is substituted or unsubstituted alkyl, alkoxy, alkenyl,

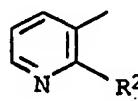
alkenyloxy, alkynyl, alkynyloxy, cycloalkyl, cycloalke-  
nyl, cycloalkyloxy, cycloalkenyloxy or phenyl;

A is one of the radicals A1 to A7

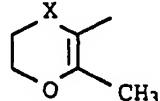
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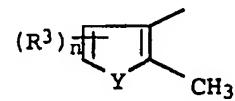
A1



A2

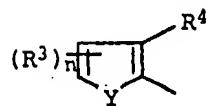


A3

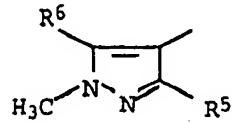


A4

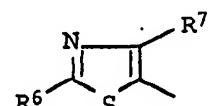
30



A5



A6



A7

35

where

40

X is -CH2-, -S-, -SO- or -SO2-;

Y is -O- or -S-;

R1, R2, R4, R5 and R7 are halogen, alkyl or haloalkyl;

R3 and R6 are hydrogen, halogen or alkyl;

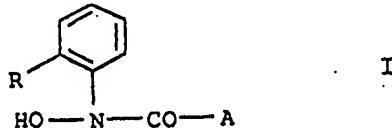
n is 1 or 2;

45

methods of manufacturing them, agents containing them, and  
their use for combatting injurious fungi.

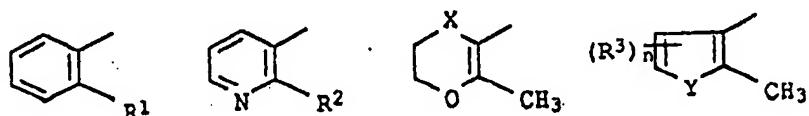
N-HYDROXY-N-PHENYLCARBOXAMIDES, THEIR PREPARATION  
AND COMPOSITIONS CONTAINING THEM FOR CONTROLLING  
HARMFUL FUNGI

The present invention relates to N-hydroxy-  
5 N-phenylcarboxamides of the formula I



where the substituents have the following meanings:

R is  $C_2$ - $C_{12}$ -alkyl,  $C_2$ - $C_{12}$ -alkoxy,  $C_3$ - $C_{12}$ -alkenyl,  
 $C_3$ - $C_{12}$ -alkenyloxy,  $C_3$ - $C_6$ -alkynyl,  $C_3$ - $C_6$ -alkynyloxy,  
where these groups can be partially or completely  
10 halogenated;  $C_3$ - $C_7$ -cycloalkyl,  $C_4$ - $C_7$ -cycloalkenyl,  
 $C_3$ - $C_7$ -cycloalkoxy or  $C_4$ - $C_7$ -cycloalkenyloxy, where  
these rings can carry one to 3  $C_1$ - $C_4$ -alkyls; phenyl  
which can carry one to five halogen atoms and/or one  
15 to three of the following radicals:  $C_1$ - $C_4$ -alkyl,  
 $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy,  $C_1$ - $C_4$ -haloalkoxy,  
 $C_1$ - $C_4$ -alkylthio or  $C_1$ - $C_4$ -haloalkylthio;  
A is a cyclic radical from the group consisting of the  
formulae A1 to A7:

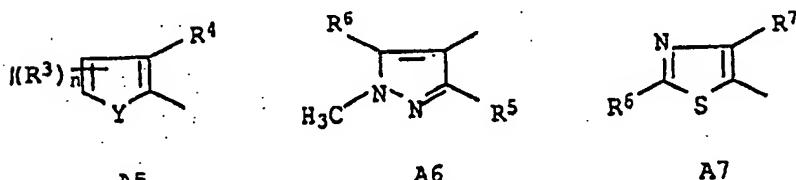


A1

A2

A3

A4



A5

A6

A7

where the substituents have the following meanings:

20 X is  $-CH_2-$ ,  $-S-$ ,  $-SO-$  or  $-SO_2-$ ;  
Y is  $-O-$  or  $-S^-$ '  
R<sup>1</sup>, R<sup>2</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>7</sup> are halogen,  $C_1$ - $C_4$ -alkyl or

$C_1-C_4$ -haloalkyl;  
 $R^3$  and  $R^6$  are hydrogen, halogen or  $C_1-C_4$ -alkyl;  
 $n$  is 1 or 2, where the radicals  $R^3$  can be different if the value of  $n$  is 2.

5 The invention additionally relates to the preparation of these compounds, compositions containing them and their use for controlling harmful fungi, in particular Botrytis.

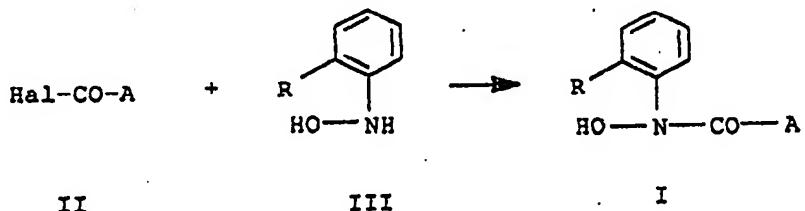
10  $N-(2\text{-Chlorophenyl})\text{-2-chloronicotinamide}$  is known from the literature as a fungicidal active compound (DE-A 2 417 216).

15 It is an object of the present invention to provide novel fungicidally active compounds having an improved spectrum of action.

15 We have found that this object is achieved by the compounds I defined at the beginning.

We have additionally found processes for preparing these compounds, compositions containing them and their use for controlling harmful fungi.

20 The compounds I are in general obtained by reacting a carboxylic acid halide of the formula II in a manner known per se (eg. J. March, Advanced Organic Chemistry, 2nd Ed., 1977, 382 ff., McGraw-Hill) with an N-hydroxyaniline of the formula III in the presence of a  
25 base.



The radical Hal in the formula II is a halogen such as chlorine, bromine or iodine, in particular chlorine or bromine.

30 This reaction is customarily carried out at temperatures from  $-20^\circ\text{C}$  to  $100^\circ\text{C}$ , preferably  $-10^\circ\text{C}$  to

50°C.

Suitable solvents are:

aliphatic hydrocarbons such as pentane, hexane, cyclohexane and petroleum ether, aromatic hydrocarbons such as toluene, o-, m- and p-xylene, halogenated hydrocarbons such as dichloromethane, chloroform and chlorobenzene, ethers such as diethyl ether, diisopropyl ether, tert-butyl methyl ether, dioxane, anisole and tetrahydrofuran, nitriles such as acetonitrile and propionitrile, ketones such as acetone, methyl ethyl ketone, diethyl ketone and tert-butyl methyl ketone, alcohols such as methanol, ethanol, n-propanol, isopropanol, n-butanol and tert-butanol, and also dimethyl sulfoxide and dimethylformamide, particularly preferably toluene, xylene and tetrahydrofuran.

Mixtures of the solvents mentioned can also be used.

Suitable bases are generally inorganic compounds such as alkali metal and alkaline earth metal hydroxides such as lithium hydroxide, sodium hydroxide, potassium hydroxide and calcium hydroxide, alkali metal and alkaline earth metal oxides such as lithium oxide, sodium oxide, calcium oxide and magnesium oxide, alkali metal and alkaline earth metal hydrides such as lithium hydride, sodium hydride, potassium hydride and calcium hydride, alkali metal amides such as lithium amide, sodium amide and potassium amide, alkali metal and alkaline earth metal carbonates such as lithium carbonate and calcium carbonate and also alkali metal hydrogen-carbonates such as sodium hydrogencarbonate, and organo-metallic compounds, in particular alkali metal alkyls such as methyl lithium, butyllithium and phenyllithium, alkylmagnesium halides such as methylmagnesium chloride and also alkali metal and alkaline earth metal alkoxides such as sodium methoxide, sodium ethoxide, potassium ethoxide, potassium tert-butoxide and dimethoxymagnesium, additionally organic bases, eg. tertiary amines such as

trimethylamine, triethylamine, tri-isopropylethylamine and N-methylpiperidine, pyridine, substituted pyridines such as collidine, lutidine and 4-dimethylaminopyridine and also bicyclic amines.

5        Sodium hydrogencarbonate, sodium carbonate, triethylamine and pyridine are particularly preferred.

10      The bases are in general employed in equimolar amounts based on the compound II. However, they can also be used in an excess of from 5 mol% to 30 mol%, preferably 5 mol% to 10 mol%, or - in the case of the use of tertiary amines - if appropriate as a solvent.

15      The starting materials are in general reacted with one another in equimolar amounts. It may be advantageous for the yield to employ II in an excess of from 1 mol% to 20 mol%, preferably 1 mol% to 10 mol%, based on III.

20      The starting substances of the formulae II and III needed for preparing the compounds I are known in the literature (Houben-Weyl, Methoden der org. Chemie (Methods of Organic Chemistry), Vol. 10/1, pp. 1138-1148) or can be prepared according to the literature cited.

With respect to their use in fungicidal compositions, suitable compounds of the formula I are those in which the substituents have the following meanings:

25      R    is  $C_2$ - $C_{12}$ -alkyl such as ethyl and straight-chain or branched propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl and dodecyl, particularly straight-chain or branched  $C_3$ - $C_{10}$ -alkyl such as propyl, 1-methylethyl, butyl, 1-methylpropyl,

30      2-methylpropyl, 1,1-dimethylethyl, n-pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 1,2-dimethylpropyl, 1,1-dimethylpropyl, 2,2-dimethylpropyl, 1-ethylpropyl, n-hexyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl,

35      4-methylpentyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 1,3-dimethylbutyl, 2,3-dimethylbutyl, 1,1-dimethylbutyl, 2,2-dimethylbutyl, 3,3-dimethyl-

butyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl,  
1-ethylbutyl, 2-ethylbutyl, 1-ethyl-3-methylpropyl,  
n-heptyl, 1-methylhexyl, 1-ethylpentyl, 2-ethyl-  
pentyl, 1-propylbutyl, octyl, 1-methylheptyl,  
2-methylheptyl, 1-ethylhexyl, 2-ethylhexyl,  
1-propylpentyl, 2-propylpentyl, nonyl, 1-methyl-  
octyl, 2-methyloctyl, 1-ethylheptyl, 2-ethylheptyl,  
1-propylhexyl, 2-propylhexyl, decyl, 1-methylnonyl,  
2-methylnonyl, 1-ethyloctyl, 2-ethyloctyl, 1-propyl-  
heptyl and 2-propylheptyl, in particular propyl,  
1-methylethyl, butyl, 1-methylbutyl, 2-methylbutyl,  
1,1-dimethylethyl, pentyl, 1-methylbutyl, hexyl,  
heptyl and 1-methylheptyl, where these groups can be  
partially or completely halogenated, ie. the  
hydrogens of these groups can be partially or com-  
pletely replaced by halogens such as fluorine,  
chlorine and bromine, in particular fluorine and  
chlorine, for example haloalkyl such as chloro-  
methyl, dichloromethyl, trichloromethyl, fluoro-  
methyl, difluoromethyl, trifluoromethyl, chloro-  
fluoromethyl, dichlorofluoromethyl, chlorodifluoro-  
methyl, 1-fluoroethyl, 2-fluoroethyl, 2,2-difluoro-  
ethyl, 2,2,2-trifluoroethyl, 2-chloro-2-fluoroethyl,  
2-chloro-2,2-difluoroethyl, 2,2-dichloro-2-fluoro-  
ethyl, 2,2,2-trichloroethyl and pentafluoroethyl;

C<sub>2</sub>-C<sub>12</sub>-alkoxy such as ethoxy and straight-chain or  
branched propoxy, butoxy, pentoxy, hexyloxy, heptyl-  
oxy, octyloxy, nonyloxy, decyloxy, undecyloxy and  
dodecyloxy, particularly straight-chain or branched  
C<sub>2</sub>-C<sub>10</sub>-alkoxy such as ethoxy, propoxy, 1-methyl-  
ethoxy, butoxy, 1-methylpropoxy, 2-methylpropoxy,  
1,1-dimethylethoxy, n-pentoxy, 1-methylbutoxy,  
2-methylbutoxy, 3-methylbutoxy, 1,2-dimethylpropoxy,  
1-ethylpropoxy, n-hexyloxy, 1-methylpentoxy,  
2-methylpentoxy, 3-methylpentoxy, 4-methylpentoxy,  
1,2-dimethylbutoxy, 1,3-dimethylbutoxy,

2,3-dimethylbutoxy, 1,2-dimethylbutoxy,  
2,2-dimethylbutoxy, 3,3-dimethylbutoxy, 1,1,2-tri-  
methylpropoxy, 1,2,2-trimethylpropoxy, 1-ethyl-  
butoxy, 2-ethylbutoxy, 1-ethyl-2-methylpropoxy,  
5  
n-heptyloxy, 1-methylhexyloxy, 2-methylhexyloxy,  
3-methylhexyloxy, 4-methylhexyloxy, 5-methylhexyl-  
oxy, 1-ethylpentoxy, 2-ethylpentoxy, 1-propylbutoxy,  
octyloxy, 1-methylheptyloxy, 2-methylheptyloxy,  
10  
1-ethylhexyloxy, 2-ethylhexyloxy, 1-propylpentoxy,  
2-propylpentoxy, nonyloxy, 1-methyloctyloxy,  
2-methyloctyloxy, 1-ethylheptyloxy, 2-ethylheptyl-  
oxy, 1-propylhexyloxy, 2-propylhexyloxy, decyloxy,  
15  
1-methylnonyloxy, 2-methylnonyloxy, 1-ethyloctyloxy,  
2-ethyloctyloxy, 1-propylheptyloxy and 2-propyl-  
heptyloxy, in particular ethoxy, propoxy, 1-methyl-  
ethoxy, butoxy, 1-methylpropoxy, 2-methylpropoxy,  
1,1-dimethylethoxy, pentoxy, hexyloxy and 2-ethyl-  
hexyloxy, where these groups can be partially or  
completely halogenated, i.e. the hydrogens of these  
20  
groups can be partially or completely replaced by  
halogens such as fluorine, chlorine and bromine, in  
particular fluorine and chlorine, for example halo-  
alkoxy such as chloromethoxy, dichloromethoxy,  
trichloromethoxy, fluoromethoxy, difluoromethoxy,  
25  
trifluoromethoxy, chlorofluoromethoxy, dichloro-  
fluoromethoxy, chlorodifluoromethoxy, 1-fluoro-  
ethoxy, 2-fluoroethoxy, 2,2-difluoroethoxy,  
2,2,2-trifluoroethoxy, 2-chloro-2-fluoroethoxy,  
2-chloro-2,2-difluoroethoxy, 2,2-dichloro-2-fluoro-  
ethoxy, 2,2,2-trichloroethoxy and pentafluoroethoxy;  
30  
C<sub>3</sub>-C<sub>12</sub>-alkenyl such as straight-chain or branched  
propenyl, butenyl, pentenyl, hexenyl, heptenyl,  
octenyl, nonenyl, decenyl, undecenyl and dodecenyl,  
particularly straight-chain or branched  
35  
C<sub>3</sub>-C<sub>10</sub>-alkenyl such as 2-propenyl, 2-butenyl,  
3-butenyl, 1-methyl-2-propenyl, 2-methyl-2-propenyl,

2-pentenyl, 3-pentenyl, 4-pentenyl, 1-methyl-  
2-butenyl, 2-methyl-2-butenyl, 3-methyl-2-butenyl,  
1-methyl-3-butenyl, 2-methyl-3-butenyl, 3-methyl-  
3-butenyl, 1,1-dimethyl-2-propenyl, 1,2-dimethyl-  
2-propenyl, 1-ethyl-2-propenyl, 2-hexenyl,  
3-hexenyl, 4-hexenyl, 5-hexenyl, 1-methyl-  
2-pentenyl, 2-methyl-2-pentenyl, 3-methyl-  
2-pentenyl, 4-methyl-2-pentenyl, 1-methyl-  
3-pentenyl, 2-methyl-3-pentenyl, 3-methyl-  
10 3-pentenyl, 4-methyl-3-pentenyl, 1-methyl-  
4-pentenyl, 2-methyl-4-pentenyl, 3-methyl-  
4-pentenyl, 4-methyl-4-pentenyl, 1,1-dimethyl-  
2-butenyl, 1,1-dimethyl-3-butenyl, 1,2-dimethyl-  
2-butenyl, 1,2-dimethyl-3-butenyl, 1,3-dimethyl-  
15 2-but enyl, 1,3-dimethyl-3-butenyl, 2,2-dimethyl-  
3-butenyl, 2,3-dimethyl-2-butenyl, 2,3-dimethyl-  
3-butenyl, 1-ethyl-2-butenyl, 1-ethyl-3-butenyl,  
2-ethyl-2-butenyl, 2-ethyl-3-butenyl, 1,1,2-tri-  
methyl-2-propenyl, 1-ethyl-1-methyl-2-propenyl,  
20 1-ethyl-2-methyl-2-propenyl, 1-methyl-2-pentenyl,  
2-methyl-2-pentenyl, 1-methyl-3-pentenyl, 2-methyl-  
3-pentenyl, 1-methyl-2-hexenyl, 2-methyl-2-hexenyl,  
1-methyl-3-hexenyl, 2-methyl-3-hexenyl, 1-ethyl-  
2-pentenyl, 2-ethyl-2-pentenyl, 1-ethyl-3-pentenyl,  
25 2-ethyl-3-pentenyl, 1-methyl-2-heptenyl, 2-methyl-  
2-heptenyl, 1-methyl-3-heptenyl, 2-methyl-  
3-heptenyl, 1-ethyl-2-hexenyl, 2-ethyl-2-hexenyl,  
1-ethyl-3-hexenyl, 2-ethyl-3-hexenyl, 1-methyl-  
2-octenyl, 2-methyl-2-octenyl, 1-methyl-3-octenyl,  
30 2-methyl-3-octenyl, 1-ethyl-2-heptenyl, 2-ethyl-  
2-heptenyl, 1-ethyl-3-heptenyl, 2-ethyl-3-heptenyl,  
1-ethyl-2-octenyl, 2-ethyl-2-octenyl, 1-ethyl-  
3-octenyl and 2-ethyl-3-octenyl, in particular  
1-propenyl, 2-propenyl, 1-methylethenyl, 1-methyl-  
2-propenyl, 2-methyl-2-propenyl, 1-ethyl-2-propenyl,  
35 1-methyl-2-butenyl, 1-ethyl-2-butenyl, 1-(1-methyl-  
ethyl)-2-butenyl, 1-butyl-2-butenyl, 1-methyl-

2-pentenyl and 1,4-dimethyl-2-pentenyl, where these groups can be partially or completely halogenated, ie. the hydrogens of these groups can be partially or completely replaced by halogens such as fluorine, chlorine and bromine, in particular fluorine and chlorine, in particular 3-chloro-2-propenyl and 2,3-dichloro-2-propenyl;

10                   C<sub>3</sub>-C<sub>12</sub>-alkenyloxy such as straight-chain or branched propenyloxy, butenyloxy, pentenyloxy, hexenyloxy, heptenyloxy, octenyloxy, nonenyloxy, decenyloxy, undecenyloxy and dodecenyloxy, particularly straight-chain or branched C<sub>3</sub>-C<sub>10</sub>-alkenyloxy such as 2-propenyloxy, 2-butenyloxy, 3-butenyloxy, 1-methyl-2-propenyloxy, 2-methyl-2-propenyloxy, 2-pentenyl-15                   oxy, 3-pentenyl-1, 4-pentenyl-1, 1-methyl-2-butenyloxy, 2-methyl-2-butenyloxy, 3-methyl-2-butenyloxy, 1-methyl-3-butenyloxy, 2-methyl-3-butenyloxy, 3-methyl-3-butenyloxy, 1,1-dimethyl-2-propenyloxy, 1,2-dimethyl-2-propenyloxy, 1-ethyl-20                   2-propenyloxy, 2-hexenyloxy, 3-hexenyloxy, 4-hexenyloxy, 5-hexenyloxy, 1-methyl-2-pentenyl-1, 2-methyl-2-pentenyl-1, 3-methyl-2-pentenyl-1, 4-methyl-2-pentenyl-1, 1-methyl-3-pentenyl-1, 2-methyl-3-pentenyl-1, 3-methyl-3-pentenyl-1, 4-methyl-3-pentenyl-1, 1-methyl-4-pentenyl-1, 2-methyl-4-pentenyl-1, 3-methyl-4-pentenyl-1, 4-methyl-4-pentenyl-1, 1,1-dimethyl-2-butenyloxy, 1,1-dimethyl-3-butenyloxy, 1,2-dimethyl-2-butenyloxy, 1,2-dimethyl-3-butenyloxy, 30                   1,3-dimethyl-2-butenyloxy, 1,3-dimethyl-3-butenyl-1, 2,2-dimethyl-3-butenyloxy, 2,3-dimethyl-2-butenyloxy, 2,3-dimethyl-3-butenyloxy, 1-ethyl-2-butenyloxy, 1-ethyl-3-butenyloxy, 2-ethyl-2-butenyloxy, 2-ethyl-3-butenyloxy, 1,1,2-trimethyl-35                   2-propenyl-1, 1-ethyl-1-methyl-2-propenyl-1, 1-ethyl-2-methyl-2-propenyl-1, 1-methyl-2-pentenyl-

oxy, 2-methyl-2-pentenyloxy, 1-methyl-3-pentenyloxy,  
2-methyl-3-pentenyloxy, 1-methyl-2-hexenyloxy,  
2-methyl-2-hexenyloxy, 1-methyl-3-hexenyloxy,  
2-methyl-3-hexenyloxy, 1-ethyl-2-pentenyloxy,  
5 2-ethyl-2-pentenyloxy, 1-ethyl-3-pentenyloxy,  
2-ethyl-3-pentenyloxy, 1-methyl-2-heptenyloxy,  
2-methyl-2-heptenyloxy, 1-methyl-3-heptenyloxy,  
2-methyl-3-heptenyloxy, 1-ethyl-2-hexenyloxy,  
2-ethyl-2-hexenyloxy, 1-ethyl-3-hexenyloxy, 2-ethyl-  
10 3-hexenyloxy, 1-methyl-2-octenyloxy, 2-methyl-  
2-octenyloxy, 1-methyl-3-octenyloxy, 2-methyl-  
3-octenyloxy, 1-ethyl-2-heptenyloxy, 2-ethyl-  
2-heptenyloxy, 1-ethyl-3-heptenyloxy, 2-ethyl-  
3-heptenyloxy, 1-ethyl-2-octenyloxy, 2-ethyl-  
15 2-octenyloxy, 1-ethyl-3-octenyloxy and 2-ethyl-  
3-octenyloxy, in particular 2-propenyloxy, 1-methyl-  
2-propenyloxy, 2-methyl-2-propenyloxy, 2-pentenyl-  
oxy, 3-pentenyloxy, 1-methyl-2-butenyloxy and  
1-methyl-2-pentenyloxy, where these groups can be  
20 partially or completely halogenated, ie. the  
hydrogens of these groups can be partially or com-  
pletely replaced by halogens such as fluorine,  
chlorine and bromine, in particular fluorine and  
chlorine, in particular 3-chloro-2-propenyloxy,  
25 2,3-dichloro-2-propenyloxy and 2,3,3-trichloro-  
2-propenyloxy;  
  
C<sub>3</sub>-C<sub>6</sub>-alkynyl such as 2-propynyl, 2-butynyl, 3-  
butynyl, 1-methyl-2-propynyl, 2-pentynyl, 3-pent-  
ynyl, 4-pentynyl, 1-methyl-3-butynyl, 2-methyl-3-  
butynyl, 1-methyl-2-butynyl, 1,1-dimethyl-2-propyn-  
yl, 1-ethyl-2-propynyl, 2-hexynyl, 3-hexynyl, 4-  
alkynyl, 5-hexynyl, 1-methyl-2-pentynyl, 1-methyl-3-  
pentynyl, 1-methyl-4-pentynyl, 2-methyl-3-pentynyl,  
2-methyl-4-pentynyl, 3-methyl-4-pentynyl, 4-methyl-  
35 2-pentynyl, 1,2-dimethyl-2-butynyl, 1,1-dimethyl-3-  
butynyl, 1,2-dimethyl-3-butynyl, 2,2-dimethyl-3-

butynyl, 1-ethyl-2-butynyl, 1-ethyl-3-butynyl, 2-ethyl-3-butynyl and 1-ethyl-1-methyl-2-propynyl, in particular 2-propynyl, 2-butynyl and 3-butynyl, where these groups can be partially or completely halogenated, ie. the hydrogens of these groups can be partially or completely replaced by halogens such as fluorine, chlorine and bromine, in particular fluorine and chlorine, for example 3-chloro-2-propynyl, 3-chloro-2-butynyl and 4-chloro-3-butynyl;

10  $C_3-C_6$ -alkynyloxy such as 2-propynyloxy, 2-butynyloxy, 3-butynyloxy, 1-methyl-2-propynyloxy, 2-pentynyloxy, 3-pentynyloxy, 3-pentynyloxy, 4-pentynyloxy, 1-methyl-3-butynyloxy, 2-methyl-3-butynyloxy, 1-methyl-2-butynyloxy, 1,1-dimethyl-2-propionyloxy, 1-ethyl-2-propynyloxy, 2-hexynyloxy, 3-hexynyloxy, 4-alkynyloxy, 5-hexynyloxy, 1-methyl-2-pentynyloxy, 1-methyl-3-pentynyloxy, 1-methyl-4-pentynyloxy, 2-methyl-3-pentynyloxy, 2-methyl-4-pentynyloxy, 3-methyl-4-pentynyloxy, 4-methyl-3-pentynyloxy, 1,1-dimethyl-2-butynyloxy, 1,1-dimethyl-3-butynyl-oxy, 1,2-dimethyl-3-butynyloxy, 2,2-dimethyl-3-butynyloxy, 1-ethyl-2-butynyloxy, 1-ethyl-3-butynyl-oxy, 2-ethyl-3-butynyloxy and 1-ethyl-1-methyl-2-propynyloxy, preferably 2-propynyloxy, 2-butynyloxy, 1-methyl-2-propynyloxy and 1-methyl-2-butynyloxy, 2-propynyloxy, 2-butynyloxy, 3-butynyloxy and 1-methyl-2-propynyloxy, where these groups can be partially or completely halogenated, ie. the hydrogens of these groups can be partially or completely replaced by halogens such as fluorine, chlorine and bromine, in particular fluorine and chlorine, for example 3-chloro-2-propynyloxy, 3-chloro-2-butynyl-oxy and 4-chloro-3-butynyl-oxy;

35  $C_3-C_6$ -cycloalkyl such as cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl and cycloheptyl, where these

rings can carry one to 3 C<sub>1</sub>-C<sub>4</sub>-alkyls such as methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl and 1,1-dimethylethyl;

5 C<sub>4</sub>-C<sub>7</sub>-cycloalkenyl such as cyclobutenyl, cyclopentenyl, cyclohexenyl and cycloheptenyl, where these rings can carry one to three C<sub>1</sub>-C<sub>4</sub>-alkyls such as methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl and 1,1-dimethylethyl;

10 C<sub>3</sub>-C<sub>7</sub>-cycloalkoxy such as cyclopropoxy, cyclobutoxy, cyclopentoxy, cyclohexyloxy and cycloheptyloxy, where these rings can carry one to 3 C<sub>1</sub>-C<sub>4</sub>-alkyls such as methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl and 1,1-dimethylethyl;

15 or C<sub>4</sub>-C<sub>7</sub>-cycloalkenyloxy such as 1-cyclobutenyloxy, 2-cyclobutenyloxy, 1-cyclopentenyloxy, 2-cyclopentenyloxy, 3-cyclopentenyloxy, 1-cyclohexenyloxy, 2-cyclohexenyloxy, 3-cyclohexenyloxy, 1-cycloheptenyloxy, 2-cycloheptenyloxy, 3-cycloheptenyloxy and 4-cycloheptenyloxy, where these rings can carry one to 3 C<sub>1</sub>-C<sub>4</sub>-alkyls such as methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl and 1,1-dimethylethyl;

20 phenyl, which can carry one to five halogens such as fluorine, chlorine, bromine and iodine, in particular fluorine, chlorine and bromine, and/or one to three of the following radicals:

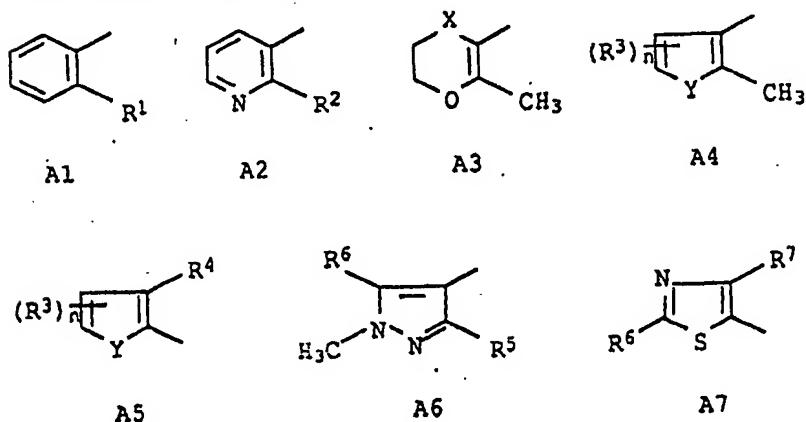
- C<sub>1</sub>-C<sub>4</sub>-alkyl as mentioned above;
- C<sub>1</sub>-C<sub>4</sub>-haloalkyl as mentioned above;
- C<sub>1</sub>-C<sub>4</sub>-alkoxy as mentioned above;
- C<sub>1</sub>-C<sub>4</sub>-haloalkoxy as mentioned above;
- C<sub>1</sub>-C<sub>4</sub>-alkylthio such as methylthio, ethylthio,

propylthio, 1-methylethylthio, butylthio, 1-methylpropylthio, 2-methylpropylthio and 1,1-dimethylethylthio;

5 - or C<sub>1</sub>-C<sub>4</sub>-haloalkylthio, particularly C<sub>1</sub>-C<sub>2</sub>-haloalkylthio such as chloromethylthio, dichloromethylthio, trichloromethylthio, fluoromethylthio, difluoromethylthio, trifluoromethylthio, chlorofluoromethylthio, dichlorofluoromethylthio, chlorodifluoromethylthio, 1-fluoroethylthio, 2-fluoroethylthio, 2,2-difluoroethylthio, 2,2,2-trifluoroethylthio, 2-chloro-2-fluoroethylthio, 2-chloro-2,2-difluoroethylthio, 2,2-dichloro-2-fluoroethylthio, 2,2,2-trichloroethylthio and pentafluoroethylthio.

10

15 A is a cyclic radical from the group consisting of the formulae A1 to A7:



where the substituents have the following meanings:

X is -CH<sub>2</sub>-, -S-, -SO- or -SO<sub>2</sub>-;

Y is -O- or -S-;

20 R<sup>1</sup>, R<sup>2</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>7</sup> independently of one another are halogen such as fluorine, chlorine and bromine, C<sub>1</sub>-C<sub>4</sub>-alkyl as mentioned above, or C<sub>1</sub>-C<sub>4</sub>-haloalkyl as mentioned above;

25 R<sup>3</sup> and R<sup>6</sup> independently of one another are hydrogen, halogen such as fluorine, chlorine and bromine or

$C_1-C_4$ -alkyl as mentioned above;  
n is 1 or 2, where the radicals  $R^3$  can be different if the value of n is 2.

With respect to the biological action, 5 particularly preferred compounds of the formula I are those in which R has the abovementioned meanings and A is a cyclic radical from the group consisting of the formulae A1 to A7, where X and Y have the abovementioned meaning and the substituents are the following radicals:

10  $R^1$  is halogen such as fluorine, chlorine and bromine, methyl or  $C_1$ -haloalkyl such as chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl and chlorodifluoromethyl;

15  $R^2$  is halogen such as fluorine, chlorine and bromine or  $C_1$ -haloalkyl such as chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl and chlorodifluoromethyl;

20  $R^3$  is hydrogen or methyl;  
n is 1 or 2, where the radicals  $R^3$  can be different if the value of n is 2;

25  $R^4$  is halogen such as fluorine, chlorine and bromine or methyl;

30  $R^5$  is methyl or  $C_1$ -haloalkyl such as chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl and chlorodifluoromethyl;

35  $R^6$  is hydrogen, halogen such as fluorine, chlorine and bromine or methyl;

30  $R^7$  is halogen such as fluorine, chlorine and bromine, methyl or  $C_1$ -haloalkyl such as chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl and chlorodifluoromethyl.

In particular, those compounds of the formula I are preferred in which R has the abovementioned meaning

and A is a cyclic radical from the group consisting of the formulae A1 to A7, where X and Y have the above-mentioned meaning and the substituents are the following groups:

5 R<sup>1</sup> is chlorine, bromine, iodine, methyl or trifluoromethyl;

R<sup>2</sup> is chlorine or trifluoromethyl;

R<sup>3</sup> is hydrogen or methyl;

n is 1 or 2, where the radicals R<sup>3</sup> can be different if

10 the value of n is 2;

R<sup>4</sup> is chlorine or methyl;

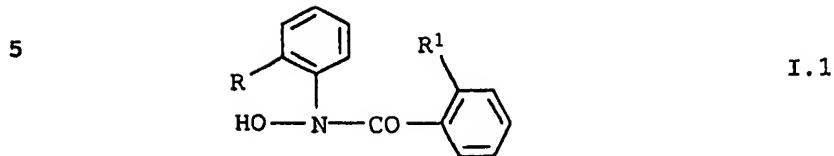
R<sup>5</sup> is methyl, difluoromethyl or trifluoromethyl;

R<sup>6</sup> is hydrogen, chlorine or methyl;

R<sup>7</sup> is chlorine, methyl or trifluoromethyl.

15 Particularly preferred compounds of the formula I are summarized in the following Tables A to G.

Table A



10	R <sup>1</sup>	R
	CF <sub>3</sub>	i-C <sub>3</sub> H <sub>7</sub>
	CF <sub>3</sub>	n-C <sub>3</sub> H <sub>7</sub>
15	CF <sub>3</sub>	n-C <sub>4</sub> H <sub>9</sub>
	CF <sub>3</sub>	sec.-C <sub>4</sub> H <sub>9</sub>
	CF <sub>3</sub>	i-C <sub>4</sub> H <sub>9</sub>
	CF <sub>3</sub>	tert.-C <sub>4</sub> H <sub>9</sub>
20	CF <sub>3</sub>	n-C <sub>5</sub> H <sub>11</sub>
	CF <sub>3</sub>	sec-C <sub>5</sub> H <sub>11</sub>
	CF <sub>3</sub>	n-C <sub>6</sub> H <sub>13</sub>
	CF <sub>3</sub>	n-C <sub>7</sub> H <sub>15</sub>
	CF <sub>3</sub>	sec.-C <sub>7</sub> H <sub>15</sub>
25	CF <sub>3</sub>	1-methylvinyl
	CF <sub>3</sub>	2-methylvinyl
	CF <sub>3</sub>	allyl
	CF <sub>3</sub>	2-methylallyl
30	CF <sub>3</sub>	2-ethylallyl
	CF <sub>3</sub>	1-methylallyl
	CF <sub>3</sub>	1-ethylallyl
	CF <sub>3</sub>	1-methyl-2-butenyl
35	CF <sub>3</sub>	1-ethyl-2-butenyl
	CF <sub>3</sub>	1-isopropyl-2-butenyl
	CF <sub>3</sub>	1-n-butyl-2-butenyl
	CF <sub>3</sub>	1-methyl-2-pentenyl
40	CF <sub>3</sub>	1,4-dimethyl-2-pentenyl
	CF <sub>3</sub>	propargyl
	CF <sub>3</sub>	2-butynyl
	CF <sub>3</sub>	3-butynyl
	CF <sub>3</sub>	ethoxy
45	CF <sub>3</sub>	propoxy
	CF <sub>3</sub>	1-methylethoxy

R <sup>1</sup>	R
CF <sub>3</sub>	n-butoxy
CF <sub>3</sub>	1-methylpropoxy
CF <sub>3</sub>	2-methylpropoxy
CF <sub>3</sub>	1,1-dimethylethoxy
CF <sub>3</sub>	n-pentyloxy
CF <sub>3</sub>	n-hexyloxy
CF <sub>3</sub>	2-ethylhexyloxy
CF <sub>3</sub>	2-propenyloxy
CF <sub>3</sub>	2-butenyloxy
CF <sub>3</sub>	2-methyl-2-propenyloxy
CF <sub>3</sub>	2-pentenyloxy
CF <sub>3</sub>	3-pentenyloxy
CF <sub>3</sub>	3-chloro-2-propenyloxy
CF <sub>3</sub>	2,3-dichloro-2-propenyloxy
CF <sub>3</sub>	2,3,3-trichloropropenyloxy
CF <sub>3</sub>	2-propynyloxy
CF <sub>3</sub>	2-butynyloxy
CF <sub>3</sub>	3-butynyloxy
CF <sub>3</sub>	1-methyl-2-propynyloxy
CF <sub>3</sub>	cyclopropyl
CF <sub>3</sub>	cyclobutyl
CF <sub>3</sub>	cyclopentyl
CF <sub>3</sub>	cyclohexyl
CF <sub>3</sub>	2-cyclopentenyl
CF <sub>3</sub>	1-cyclopentenyl
CF <sub>3</sub>	2-cyclohexenyl
CF <sub>3</sub>	1-cyclohexenyl
CF <sub>3</sub>	cyclopentyloxy
CF <sub>3</sub>	cyclohexyloxy
CF <sub>3</sub>	2-cyclopentenyloxy
CF <sub>3</sub>	2-cyclohexenyloxy
CF <sub>3</sub>	phenyl
Cl	i-C <sub>3</sub> H <sub>7</sub>
Cl	n-C <sub>3</sub> H <sub>7</sub>
Cl	n-C <sub>4</sub> H <sub>9</sub>
Cl	sec.-C <sub>4</sub> H <sub>9</sub>
Cl	i-C <sub>4</sub> H <sub>9</sub>
Cl	tert.-C <sub>4</sub> H <sub>9</sub>

R <sup>1</sup>	R
Cl	n-C <sub>5</sub> H <sub>11</sub>
Cl	sec.-C <sub>5</sub> H <sub>11</sub>
Cl	n-C <sub>6</sub> H <sub>13</sub>
Cl	n-C <sub>7</sub> H <sub>15</sub>
Cl	sec.-C <sub>7</sub> H <sub>15</sub>
Cl	1-methylvinyl
Cl	2-methylvinyl
Cl	allyl
Cl	2-methylvinyl
Cl	2-ethylallyl
Cl	1-methylallyl
Cl	1-ethylallyl
Cl	1-methyl-2-butenyl
Cl	1-ethyl-2-butenyl
Cl	1-isopropyl-2-butenyl
Cl	1-n-buty1-2-butenyl
Cl	methyl-2-pentenyl
Cl	1,4-dimethyl-2-pentenyl
Cl	propargyl
Cl	2-butynyl
Cl	3-butynyl
Cl	ethoxy
Cl	propoxy
Cl	1-methylethoxy
Cl	n-butoxy
Cl	1-methylpropoxy
Cl	2-methylpropoxy
Cl	1,1-dimethylethoxy
Cl	n-pentyloxy
Cl	n-hexyloxy
Cl	2-ethylhexyloxy
Cl	2-propenyloxy
Cl	2-butenyloxy
Cl	2-methyl-2-propenyloxy
Cl	2-pentenyloxy
Cl	3-pentenyloxy
Cl	3-chloro-2-propenyloxy
Cl	2,3-dichloro-2-propenyloxy

R <sup>1</sup>	R
C1	2,3,3-trichloropropenylloxy
5	2-propynylloxy
C1	2-butynylloxy
C1	3-butynylloxy
10	1-methyl-2-propynylloxy
C1	cyclopropyl
15	cyclobutyl
C1	cyclopentyl
C1	cyclohexyl
C1	2-cyclopentenyl
20	1-cyclopentenyl
C1	2-cyclohexenyl
C1	1-cyclohexenyl
C1	cyclopentyloxy
25	cyclohexyloxy
C1	2-cyclopentenylloxy
C1	2-cyclohexenylloxy
C1	phenyl

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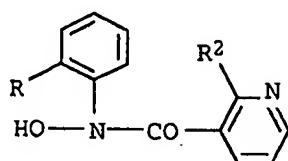
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Table B

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I.2

10	R <sup>2</sup>	R
	C1	i-C <sub>3</sub> H <sub>7</sub>
	C1	n-C <sub>3</sub> H <sub>7</sub>
	C1	n-C <sub>4</sub> H <sub>9</sub>
15	C1	sec.-C <sub>4</sub> H <sub>9</sub>
	C1	i-C <sub>4</sub> H <sub>9</sub>
	C1	tert.-C <sub>4</sub> H <sub>9</sub>
	C1	n-C <sub>5</sub> H <sub>11</sub>
20	C1	sec.-C <sub>5</sub> H <sub>11</sub>
	C1	n-C <sub>6</sub> H <sub>13</sub>
	C1	n-C <sub>7</sub> H <sub>15</sub>
	C1	sec.-C <sub>7</sub> H <sub>15</sub>
25	C1	1-methylvinyl
	C1	2-methylvinyl
	C1	allyl
	C1	2-methylallyl
	C1	2-ethylallyl
30	C1	1-methylallyl
	C1	1-ethylallyl
	C1	1-methyl-2-butenyl
	C1	1-ethyl-2-butenyl
35	C1	1-isopropyl-2-butenyl
	C1	1-n-butyl-2-butenyl
	C1	1-methyl-2-pentenyl
	C1	1,4-dimethyl-2-pentenyl
40	C1	propargyl
	C1	2-butynyl
	C1	3-butynyl
	C1	ethoxy
45	C1	propoxy
	C1	1-methylethoxy
	C1	n-butoxy

R <sup>2</sup>	R
5	C1 1-methylpropoxy
	C1 2-methylpropoxy
	C1 1,1-dimethylethoxy
	C1 n-pentyloxy
	C1 n-hexyloxy
10	C1 2-ethylhexyloxy
	C1 2-propenyloxy
	C1 2-butenyloxy
	C1 2-methyl-2-propenyloxy
	C1 2-pentenyloxy
15	C1 3-pentenyloxy
	C1 3-chloro-2-propenyloxy
	C1 2,3-dichloro-2-propenyloxy
	C1 2,3,3-trichloropropenyloxy
20	C1 2-propynyloxy
	C1 2-butynyloxy
	C1 3-butynyloxy
	C1 1-methyl-2-propynyloxy
25	C1 cyclopropyl
	C1 cyclobutyl
	C1 cyclopentyl
	C1 cyclohexyl
30	C1 2-cyclopentenyl
	C1 1-cyclopentenyl
	C1 2-cyclohexenyl
	C1 1-cyclohexenyl
	C1 cyclopentyloxy
35	C1 cyclohexyloxy
	C1 2-cyclopentenyloxy
	C1 2-cyclohexenyloxy
	C1 i-C <sub>3</sub> H <sub>7</sub>
40	C1 n-C <sub>3</sub> H <sub>7</sub>
	C1 n-C <sub>4</sub> H <sub>9</sub>
	C1 sec.-C <sub>4</sub> H <sub>9</sub>
	C1 i-C <sub>4</sub> H <sub>9</sub>
45	C1 tert.-C <sub>4</sub> H <sub>9</sub>
	C1 n-C <sub>5</sub> H <sub>11</sub>
	C1 sec.-C <sub>5</sub> H <sub>11</sub>

R <sup>2</sup>	R
C1	n-C <sub>6</sub> H <sub>13</sub>
5	n-C <sub>7</sub> H <sub>15</sub>
C1	sec.-C <sub>7</sub> H <sub>15</sub>
C1	ethoxy
10	propoxy
C1	1-methylethoxy
C1	n-butoxy
C1	1-methylpropoxy
C1	2-methylpropoxy
15	1,1-dimethylethoxy
C1	n-pentyloxy
C1	n-hexyloxy
C1	cyclopentyl
C1	phenyl

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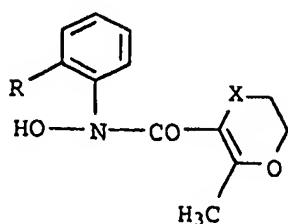
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Table C

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I.3

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	X	R
	CH <sub>2</sub>	i-C <sub>3</sub> H <sub>7</sub>
15	CH <sub>2</sub>	n-C <sub>3</sub> H <sub>7</sub>
	CH <sub>2</sub>	n-C <sub>4</sub> H <sub>9</sub>
	CH <sub>2</sub>	sec.-C <sub>4</sub> H <sub>9</sub>
	CH <sub>2</sub>	i-C <sub>4</sub> H <sub>9</sub>
20	CH <sub>2</sub>	tert.-C <sub>4</sub> H <sub>9</sub>
	CH <sub>2</sub>	n-C <sub>5</sub> H <sub>11</sub>
	CH <sub>2</sub>	sec.-C <sub>5</sub> H <sub>11</sub>
	CH <sub>2</sub>	n-C <sub>6</sub> H <sub>13</sub>
25	CH <sub>2</sub>	n-C <sub>7</sub> H <sub>15</sub>
	CH <sub>2</sub>	sec.-C <sub>7</sub> H <sub>15</sub>
	CH <sub>2</sub>	1-methylvinyl
	CH <sub>2</sub>	2-methylvinyl
	CH <sub>2</sub>	allyl
30	CH <sub>2</sub>	2-methylallyl
	CH <sub>2</sub>	2-ethylallyl
	CH <sub>2</sub>	1-methylallyl
	CH <sub>2</sub>	1-ethylallyl
35	CH <sub>2</sub>	1-methyl-2-butenyl
	CH <sub>2</sub>	1-ethyl-2-butenyl
	CH <sub>2</sub>	1-isopropyl-2-butenyl
	CH <sub>2</sub>	1-n-butyl-2-butenyl
40	CH <sub>2</sub>	1-methyl-2-pentenyl
	CH <sub>2</sub>	1,4-dimethyl-2-pentenyl
	CH <sub>2</sub>	propargyl
	CH <sub>2</sub>	2-butynyl
	CH <sub>2</sub>	3-butynyl
45	CH <sub>2</sub>	ethoxy
	CH <sub>2</sub>	propoxy

X	R
CH <sub>2</sub>	1-methylethoxy
5 CH <sub>2</sub>	n-butoxy
CH <sub>2</sub>	1-methylpropoxy
CH <sub>2</sub>	2-methylpropoxy
CH <sub>2</sub>	1,1-dimethylethoxy
10 CH <sub>2</sub>	n-pentyloxy
CH <sub>2</sub>	n-hexyloxy
CH <sub>2</sub>	2-ethylhexyloxy
CH <sub>2</sub>	2-propenyloxy
CH <sub>2</sub>	2-butenyloxy
15 CH <sub>2</sub>	2-methyl-2-propenyloxy
CH <sub>2</sub>	2-pentenyloxy
CH <sub>2</sub>	3-pentenyloxy
CH <sub>2</sub>	3-chloro-2-propenyloxy
20 CH <sub>2</sub>	2,3-dichloro-2-propenyloxy
CH <sub>2</sub>	2,3,3-trichloropropenyloxy
CH <sub>2</sub>	2-propynyloxy
CH <sub>2</sub>	2-butynyloxy
CH <sub>2</sub>	3-butynyloxy
25 CH <sub>2</sub>	1-methyl-2-propynyloxy
CH <sub>2</sub>	cyclopropyl
CH <sub>2</sub>	cyclobutyl
CH <sub>2</sub>	cyclopentyl
30 CH <sub>2</sub>	cyclohexyl
CH <sub>2</sub>	2-cyclopentenyl
CH <sub>2</sub>	1-cyclopentenyl
CH <sub>2</sub>	2-cyclohexenyl
35 CH <sub>2</sub>	1-cyclohexenyl
CH <sub>2</sub>	cyclopentyloxy
CH <sub>2</sub>	cyclohexyloxy
CH <sub>2</sub>	2-cyclopentenyloxy
40 CH <sub>2</sub>	2-cyclohexenyloxy
S	i-C <sub>3</sub> H <sub>7</sub>
S	n-C <sub>3</sub> H <sub>7</sub>
S	n-C <sub>4</sub> H <sub>9</sub>
S	sec.-C <sub>4</sub> H <sub>9</sub>
45 S	i-C <sub>4</sub> H <sub>9</sub>
S	tert.-C <sub>4</sub> H <sub>9</sub>

X	R
	S n-C <sub>5</sub> H <sub>11</sub>
5	S sec.-C <sub>5</sub> H <sub>11</sub>
	S n-C <sub>6</sub> H <sub>13</sub>
	S n-C <sub>7</sub> H <sub>15</sub>
	S sec.-C <sub>7</sub> H <sub>15</sub>
10	S ethoxy
	S propoxy
	S 1-methylethoxy
	S n-butoxy
	S 1-methylpropoxy
15	S 2-methylpropoxy
	S 1,1-dimethylethoxy
	S n-pentylloxy
	S n-hexylloxy
20	S cyclopentyl
	S phenyl

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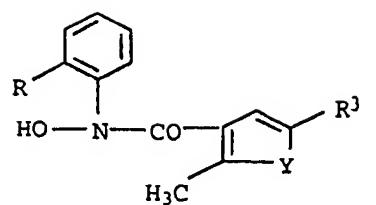
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Table D

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I.4

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	R <sup>3</sup>	R	Y
	H	i-C <sub>3</sub> H <sub>7</sub>	O
15	H	n-C <sub>3</sub> H <sub>7</sub>	O
	H	n-C <sub>4</sub> H <sub>9</sub>	O
	H	sec.-C <sub>4</sub> H <sub>9</sub>	O
	H	i-C <sub>4</sub> H <sub>9</sub>	O
20	H	tert.-C <sub>4</sub> H <sub>9</sub>	O
	H	n-C <sub>5</sub> H <sub>11</sub>	O
	H	sec.-C <sub>5</sub> H <sub>11</sub>	O
	H	n-C <sub>6</sub> H <sub>13</sub>	O
	H	n-C <sub>7</sub> H <sub>15</sub>	O
25	H	sec.-C <sub>7</sub> H <sub>15</sub>	O
	H	ethoxy	O
	H	propoxy	O
	H	1-methylethoxy	O
30	H	n-butoxy	O
	H	1-methylpropoxy	O
	H	2-methylpropoxy	O
	H	1,1-dimethylethoxy	O
	H	n-pentyloxy	O
35	H	n-hexyloxy	O
	H	cyclopentyl	O
	H	cyclohexyl	O
	H	2-cyclopentenyl	O
40	H	1-cyclopentenyl	O
	H	2-cyclohexenyl	O
	H	1-cyclohexenyl	O
	H	cyclopentyloxy	O
45	H	cyclohexyloxy	O
	H	2-cyclopentenyloxy	O

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	R <sup>3</sup>	R	Y
5	H	2-cyclohexenyloxy	o
	CH <sub>3</sub>	i-C <sub>3</sub> H <sub>7</sub>	o
	CH <sub>3</sub>	n-C <sub>3</sub> H <sub>7</sub>	o
	CH <sub>3</sub>	n-C <sub>4</sub> H <sub>9</sub>	o
	CH <sub>3</sub>	sec.-C <sub>4</sub> H <sub>9</sub>	o
	CH <sub>3</sub>	i-C <sub>4</sub> H <sub>9</sub>	o
10	CH <sub>3</sub>	tert.-C <sub>4</sub> H <sub>9</sub>	o
	CH <sub>3</sub>	n-C <sub>5</sub> H <sub>11</sub>	o
	CH <sub>3</sub>	sec.-C <sub>5</sub> H <sub>11</sub>	o
	CH <sub>3</sub>	n-C <sub>6</sub> H <sub>13</sub>	o
	CH <sub>3</sub>	n-C <sub>7</sub> H <sub>15</sub>	o
	CH <sub>3</sub>	sec.-C <sub>7</sub> H <sub>15</sub>	o
15	CH <sub>3</sub>	ethoxy	o
	CH <sub>3</sub>	propoxy	o
	CH <sub>3</sub>	1-methylethoxy	o
	CH <sub>3</sub>	n-butoxy	o
	CH <sub>3</sub>	1-methylpropoxy	o
	CH <sub>3</sub>	2-methylpropoxy	o
20	CH <sub>3</sub>	1,1-dimethylethoxy	o
	CH <sub>3</sub>	n-pentyloxy	o
	CH <sub>3</sub>	n-hexyloxy	o
	CH <sub>3</sub>	cyclopentyl	o
	CH <sub>3</sub>	phenyl	o

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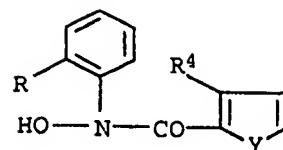
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Table E

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I.5

	R <sup>4</sup>	R	Y
10	CH <sub>3</sub>	i-C <sub>3</sub> H <sub>7</sub>	O
	CH <sub>3</sub>	n-C <sub>3</sub> H <sub>7</sub>	O
	CH <sub>3</sub>	n-C <sub>4</sub> H <sub>9</sub>	O
15	CH <sub>3</sub>	sec.-C <sub>4</sub> H <sub>9</sub>	O
	CH <sub>3</sub>	i-C <sub>4</sub> H <sub>9</sub>	O
	CH <sub>3</sub>	tert.-C <sub>4</sub> H <sub>9</sub>	O
20	CH <sub>3</sub>	n-C <sub>5</sub> H <sub>11</sub>	O
	CH <sub>3</sub>	sec.-C <sub>5</sub> H <sub>11</sub>	O
	CH <sub>3</sub>	n-C <sub>6</sub> H <sub>13</sub>	O
25	CH <sub>3</sub>	n-C <sub>7</sub> H <sub>15</sub>	O
	CH <sub>3</sub>	sec.-C <sub>7</sub> H <sub>15</sub>	O
	CH <sub>3</sub>	ethoxy	O
30	CH <sub>3</sub>	propoxy	O
	CH <sub>3</sub>	1-methylethoxy	O
	CH <sub>3</sub>	n-butoxy	O
35	CH <sub>3</sub>	1-methylpropoxy	O
	CH <sub>3</sub>	2-methylpropoxy	O
	CH <sub>3</sub>	1,1-dimethylethoxy	O
40	CH <sub>3</sub>	n-pentyloxy	O
	CH <sub>3</sub>	n-hexyloxy	O
	CH <sub>3</sub>	cyclopentyl	O
45	CH <sub>3</sub>	cyclopentenyl	O
	CH <sub>3</sub>	i-C <sub>3</sub> H <sub>7</sub>	S
	CH <sub>3</sub>	n-C <sub>3</sub> H <sub>7</sub>	S
50	CH <sub>3</sub>	n-C <sub>4</sub> H <sub>9</sub>	S
	CH <sub>3</sub>	sec.-C <sub>4</sub> H <sub>9</sub>	S
	CH <sub>3</sub>	i-C <sub>4</sub> H <sub>9</sub>	S
55	CH <sub>3</sub>	tert.-C <sub>4</sub> H <sub>9</sub>	S
	CH <sub>3</sub>	n-C <sub>5</sub> H <sub>11</sub>	S
	CH <sub>3</sub>	sec.-C <sub>5</sub> H <sub>11</sub>	S
60	CH <sub>3</sub>	n-C <sub>6</sub> H <sub>13</sub>	S

R <sup>4</sup>	R	Y
CH <sub>3</sub>	n-C <sub>7</sub> H <sub>15</sub>	S
CH <sub>3</sub>	sec.-C <sub>7</sub> H <sub>15</sub>	S
CH <sub>3</sub>	ethoxy	S
CH <sub>3</sub>	propoxy	S
CH <sub>3</sub>	1-methylethoxy	S
CH <sub>3</sub>	n-butoxy	S
CH <sub>3</sub>	1-methylpropoxy	S
CH <sub>3</sub>	2-methylpropoxy	S
CH <sub>3</sub>	1,1-dimethylethoxy	S
CH <sub>3</sub>	n-pentyloxy	S
CH <sub>3</sub>	n-hexyloxy	S
CH <sub>3</sub>	cyclopentyl	S
CH <sub>3</sub>	cyclopentenyl	S

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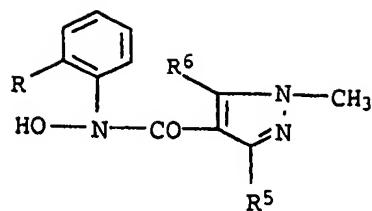
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Table F

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I.6

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	R <sup>5</sup>	R <sup>6</sup>	R
15	CH <sub>3</sub>	H	i-C <sub>3</sub> H <sub>7</sub>
	CH <sub>3</sub>	H	n-C <sub>3</sub> H <sub>7</sub>
	CH <sub>3</sub>	H	n-C <sub>4</sub> H <sub>9</sub>
	CH <sub>3</sub>	H	sec.-C <sub>4</sub> H <sub>9</sub>
20	CH <sub>3</sub>	H	i-C <sub>4</sub> H <sub>9</sub>
	CH <sub>3</sub>	H	tert.-C <sub>4</sub> H <sub>9</sub>
	CH <sub>3</sub>	H	n-C <sub>5</sub> H <sub>11</sub>
	CH <sub>3</sub>	H	sec.-C <sub>5</sub> H <sub>11</sub>
25	CH <sub>3</sub>	H	n-C <sub>6</sub> H <sub>13</sub>
	CH <sub>3</sub>	H	n-C <sub>7</sub> H <sub>15</sub>
	CH <sub>3</sub>	H	sec.-C <sub>7</sub> H <sub>15</sub>
	CH <sub>3</sub>	H	1-methylvinyl
30	CH <sub>3</sub>	H	2-methylvinyl
	CH <sub>3</sub>	H	allyl
	CH <sub>3</sub>	H	2-methylallyl
	CH <sub>3</sub>	H	2-ethylallyl
35	CH <sub>3</sub>	H	1-methylallyl
	CH <sub>3</sub>	H	1-ethylallyl
	CH <sub>3</sub>	H	1-methyl-2-butenyl
	CH <sub>3</sub>	H	1-ethyl-2-butenyl
40	CH <sub>3</sub>	H	1-isopropyl-2-butenyl
	CH <sub>3</sub>	H	1-n-butyl-2-butenyl
	CH <sub>3</sub>	H	1-methyl-2-pentenyl
	CH <sub>3</sub>	H	1,4-dimethyl-2-pentenyl
45	CH <sub>3</sub>	H	propargyl
	CH <sub>3</sub>	H	2-butynyl
	CH <sub>3</sub>	H	3-butynyl
	CH <sub>3</sub>	H	ethoxy
	CH <sub>3</sub>	H	propoxy

	R <sup>5</sup>	R <sup>6</sup>	R
5	CH <sub>3</sub>	H	1-methylethoxy
	CH <sub>3</sub>	H	n-butoxy
	CH <sub>3</sub>	H	1-methylpropoxy
	CH <sub>3</sub>	H	2-methylpropoxy
	CH <sub>3</sub>	H	1,1-dimethylethoxy
	CH <sub>3</sub>	H	n-pentyloxy
10	CH <sub>3</sub>	H	n-hexyloxy
	CH <sub>3</sub>	H	2-ethylhexyloxy
	CH <sub>3</sub>	H	2-propenyloxy
	CH <sub>3</sub>	H	2-butenyloxy
	CH <sub>3</sub>	H	2-methyl-2-propenyloxy
	CH <sub>3</sub>	H	2-pentenyloxy
15	CH <sub>3</sub>	H	3-pentenyloxy
	CH <sub>3</sub>	H	3-chloro-2-propenyloxy
	CH <sub>3</sub>	H	2,3-dichloro-2-propenyloxy
	CH <sub>3</sub>	H	2,3,3-trichloropropenyloxy
	CH <sub>3</sub>	H	2-propynyloxy
	CH <sub>3</sub>	H	2-butynyloxy
20	CH <sub>3</sub>	H	3-butynyloxy
	CH <sub>3</sub>	H	1-methyl-2-propynyloxy
	CH <sub>3</sub>	H	cyclopropyl
	CH <sub>3</sub>	H	cyclobutyl
	CH <sub>3</sub>	H	cyclopentyl
	CH <sub>3</sub>	H	cyclohexyl
25	CH <sub>3</sub>	H	2-cyclopentenyl
	CH <sub>3</sub>	H	1-cyclopentenyl
	CH <sub>3</sub>	H	2-cyclohexenyl
	CH <sub>3</sub>	H	1-cyclohexenyl
	CH <sub>3</sub>	H	cyclopentyloxy
	CH <sub>3</sub>	H	cyclohexyloxy
30	CH <sub>3</sub>	H	2-cyclopentenyloxy
	CH <sub>3</sub>	H	2-cyclohexenyloxy
	CF <sub>3</sub>	H	i-C <sub>3</sub> H <sub>7</sub>
	CF <sub>3</sub>	H	n-C <sub>3</sub> H <sub>7</sub>
	CF <sub>3</sub>	H	n-C <sub>4</sub> H <sub>9</sub>
	CF <sub>3</sub>	H	sec.-C <sub>4</sub> H <sub>9</sub>
35	CF <sub>3</sub>	H	i-C <sub>4</sub> H <sub>9</sub>
	CF <sub>3</sub>	H	tert.-C <sub>4</sub> H <sub>9</sub>

	R <sup>5</sup>	R <sup>6</sup>	R
5	CF <sub>3</sub>	H	n-C <sub>5</sub> H <sub>11</sub>
	CF <sub>3</sub>	H	sec.-C <sub>5</sub> H <sub>11</sub>
	CF <sub>3</sub>	H	n-C <sub>6</sub> H <sub>13</sub>
	CF <sub>3</sub>	H	n-C <sub>7</sub> H <sub>15</sub>
	CF <sub>3</sub>	H	sec.-C <sub>7</sub> H <sub>15</sub>
10	CF <sub>3</sub>	H	ethoxy
	CF <sub>3</sub>	H	propoxy
	CF <sub>3</sub>	H	1-methylethoxy
	CF <sub>3</sub>	H	n-butoxy
	CF <sub>3</sub>	H	1-methylpropoxy
15	CF <sub>3</sub>	H	2-methylpropoxy
	CF <sub>3</sub>	H	1,1-dimethylethoxy
	CF <sub>3</sub>	H	n-pentyloxy
	CF <sub>3</sub>	H	n-hexyloxy
	CF <sub>3</sub>	H	cyclopentyl
20	CF <sub>3</sub>	H	cyclopentenyl
	CF <sub>3</sub>	H	phenyl

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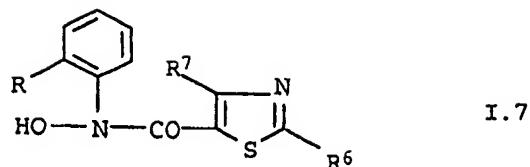
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Table G

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	R <sup>7</sup>	R <sup>6</sup>	R
15	CF <sub>3</sub>	CH <sub>3</sub>	i-C <sub>3</sub> H <sub>7</sub>
	CF <sub>3</sub>	CH <sub>3</sub>	n-C <sub>3</sub> H <sub>7</sub>
20	CF <sub>3</sub>	CH <sub>3</sub>	n-C <sub>4</sub> H <sub>9</sub>
	CF <sub>3</sub>	CH <sub>3</sub>	sec.-C <sub>4</sub> H <sub>9</sub>
	CF <sub>3</sub>	CH <sub>3</sub>	i-C <sub>4</sub> H <sub>9</sub>
25	CF <sub>3</sub>	CH <sub>3</sub>	tert.-C <sub>4</sub> H <sub>9</sub>
	CF <sub>3</sub>	CH <sub>3</sub>	n-C <sub>5</sub> H <sub>11</sub>
	CF <sub>3</sub>	CH <sub>3</sub>	sec.-C <sub>5</sub> H <sub>11</sub>
30	CF <sub>3</sub>	CH <sub>3</sub>	n-C <sub>6</sub> H <sub>13</sub>
	CF <sub>3</sub>	CH <sub>3</sub>	n-C <sub>7</sub> H <sub>15</sub>
	CF <sub>3</sub>	CH <sub>3</sub>	sec.-C <sub>7</sub> H <sub>15</sub>
35	CF <sub>3</sub>	CH <sub>3</sub>	1-methylvinyl
	CF <sub>3</sub>	CH <sub>3</sub>	2-methylvinyl
	CF <sub>3</sub>	CH <sub>3</sub>	allyl
	CF <sub>3</sub>	CH <sub>3</sub>	2-methylallyl
40	CF <sub>3</sub>	CH <sub>3</sub>	2-ethylallyl
	CF <sub>3</sub>	CH <sub>3</sub>	1-methylallyl
	CF <sub>3</sub>	CH <sub>3</sub>	1-ethylallyl
	CF <sub>3</sub>	CH <sub>3</sub>	1-methyl-2-butenyl
45	CF <sub>3</sub>	CH <sub>3</sub>	1-ethyl-2-butenyl
	CF <sub>3</sub>	CH <sub>3</sub>	1-isopropyl-2-butenyl
	CF <sub>3</sub>	CH <sub>3</sub>	1-n-butyl-2-butenyl
	CF <sub>3</sub>	CH <sub>3</sub>	1-methyl-2-pentenyl
	CF <sub>3</sub>	CH <sub>3</sub>	1,4-dimethyl-2-pentenyl
	CF <sub>3</sub>	CH <sub>3</sub>	propargyl
	CF <sub>3</sub>	CH <sub>3</sub>	2-butynyl
	CF <sub>3</sub>	CH <sub>3</sub>	3-butynyl
	CF <sub>3</sub>	CH <sub>3</sub>	ethoxy
	CF <sub>3</sub>	CH <sub>3</sub>	propoxy
	CF <sub>3</sub>	CH <sub>3</sub>	1-methylethoxy

	R <sup>7</sup>	R <sup>6</sup>	R
5	CF <sub>3</sub>	CH <sub>3</sub>	n-butoxy
	CF <sub>3</sub>	CH <sub>3</sub>	1-methylpropoxy
	CF <sub>3</sub>	CH <sub>3</sub>	2-methylpropoxy
	CF <sub>3</sub>	CH <sub>3</sub>	1,1-dimethylmethoxy
	CF <sub>3</sub>	CH <sub>3</sub>	n-pentyloxy
10	CF <sub>3</sub>	CH <sub>3</sub>	n-hexyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	2-ethylhexyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	2-propenyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	2-butenyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	2-methyl-2-propenyloxy
15	CF <sub>3</sub>	CH <sub>3</sub>	2-pentenyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	3-pentenyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	3-chloro-2-propenyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	2,3-dichloro-2-propenyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	2,3,3-trichloropropenyloxy
20	CF <sub>3</sub>	CH <sub>3</sub>	2-propynyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	2-butyynyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	3-butyynyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	1-methyl-2-propynyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	cyclopropyl
25	CF <sub>3</sub>	CH <sub>3</sub>	cyclobutyl
	CF <sub>3</sub>	CH <sub>3</sub>	cyclopentyl
	CF <sub>3</sub>	CH <sub>3</sub>	cyclohexyl
	CF <sub>3</sub>	CH <sub>3</sub>	2-cyclopentenyl
	CF <sub>3</sub>	CH <sub>3</sub>	1-cyclopentenyl
30	CF <sub>3</sub>	CH <sub>3</sub>	2-cyclohexenyl
	CF <sub>3</sub>	CH <sub>3</sub>	1-cyclohexenyl
	CF <sub>3</sub>	CH <sub>3</sub>	cyclopentyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	cyclohexyloxy
	CF <sub>3</sub>	CH <sub>3</sub>	2-cyclopentenyloxy
35	CF <sub>3</sub>	CH <sub>3</sub>	2-cyclohexenyloxy
	CH <sub>3</sub>	CH <sub>3</sub>	i-C <sub>3</sub> H <sub>7</sub>
	CH <sub>3</sub>	CH <sub>3</sub>	n-C <sub>3</sub> H <sub>7</sub>
	CH <sub>3</sub>	CH <sub>3</sub>	n-C <sub>4</sub> H <sub>9</sub>
	CH <sub>3</sub>	CH <sub>3</sub>	sec.-C <sub>4</sub> H <sub>9</sub>
40	CH <sub>3</sub>	CH <sub>3</sub>	i-C <sub>4</sub> H <sub>9</sub>
	CH <sub>3</sub>	CH <sub>3</sub>	tert.-C <sub>4</sub> H <sub>9</sub>
	CH <sub>3</sub>	CH <sub>3</sub>	n-C <sub>5</sub> H <sub>11</sub>

	R <sup>7</sup>	R <sup>6</sup>	R
5	CH <sub>3</sub>	CH <sub>3</sub>	sec.-C <sub>5</sub> H <sub>11</sub>
	CH <sub>3</sub>	CH <sub>3</sub>	n-C <sub>6</sub> H <sub>13</sub>
	CH <sub>3</sub>	CH <sub>3</sub>	n-C <sub>7</sub> H <sub>15</sub>
	CH <sub>3</sub>	CH <sub>3</sub>	sec.-C <sub>7</sub> H <sub>15</sub>
10	CH <sub>3</sub>	CH <sub>3</sub>	ethoxy
	CH <sub>3</sub>	CH <sub>3</sub>	propoxy
	CH <sub>3</sub>	CH <sub>3</sub>	1-methylethoxy
	CH <sub>3</sub>	CH <sub>3</sub>	n-butoxy
15	CH <sub>3</sub>	CH <sub>3</sub>	1-methylpropoxy
	CH <sub>3</sub>	CH <sub>3</sub>	2-methylpropoxy
	CH <sub>3</sub>	CH <sub>3</sub>	1,1-dimethylethoxy
	CH <sub>3</sub>	CH <sub>3</sub>	n-pentyloxy
20	CH <sub>3</sub>	CH <sub>3</sub>	n-hexyloxy
	CH <sub>3</sub>	CH <sub>3</sub>	cyclopentyl
	CH <sub>3</sub>	CH <sub>3</sub>	cyclopentenyl
	CH <sub>3</sub>	CH <sub>3</sub>	phenyl

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The novel active ingredients are particularly suitable for protecting various materials against degradation or destruction by bacteria or fungi or from being attacked by and covered with microorganisms. Examples of materials which can be preserved or microbically finished with the novel active ingredients are glues and adhesives, starch solutions, wax emulsions, clay emulsions, sizes, finishes, spinning baths, gelatine formulations, putty, joint sealants, cooling lubricants, drilling oils, fuels, plastic dispersions, emulsion paints, textiles, leather, raw hides and cosmetics. The compounds are also suitable as anti-slime agents in the paper industry, in cooling towers and in air moistening units.

The compounds I are also suitable for protecting the following plant species against attack by microorganisms:

cereals (e.g., wheat, barley, rye, oats, rice, sorghum and related species); beets (e.g., sugar and fodder beets); pomes, drupes and aggregate fruit (e.g., apples, pears, plums, peaches, 20 almonds, cherries, strawberries, raspberries and blackberries); legumes (e.g., beans, lentils, peas, soybeans); oil-yielding crops (e.g., rape, mustard, poppies, olives, sunflowers, coco-nuts, castor-oil beans, cocoa beans, groundnuts); cucurbits (e.g., pumpkins, cucumbers, melons); fiber-yielding plants (e.g., 25 cotton, flax, hemp, jute); citrus fruit (e.g., oranges, lemons, grapefruit, tangerines); vegetables (e.g., spinach, lettuce, asparagus, cabbage varieties, carrots, onions, tomatoes, potatoes, paprika); laurel species (e.g., avocado, cinnamomum, camphor) or plants such as Indian corn, tobacco, nuts, coffee, sugar cane, 30 tea, grapes, hops, and banana and rubber trees. For the purposes of the present invention, the term "plants" is also taken to mean all types of other green growth, whether ornamentals, grassy areas, embankments, or generally low-growing cover crops.

35 For example the following microorganisms may be combatted with the novel compounds I:

Straphylococcus aureus, Escherichia coli, Klebsielle pneumoniae, Citrobacter freundii, Proteus vulgaris, Pseudomonas aeruginosa, 40 Desulfovibrio desulfuricans, Streptoverticillium rubrireticuli, Aspergillus niger, Aspergillus versicolor, Penicillium funiculosum, Penicillium expansum, Penicillium glaucum, Paecilomyces variotii, Trichoderma viride, Chaetomium globosum, Aspergillus ams-telodami, Phoma pigmentovora, Phoma violacea, Aureobasidium pul- 45 lulans, Saccharomyces cerevisiae, Alternaria tenuis, Stemphylium macrosporoideum, Cladosporium herbarum, Cladosporium resinae, Candida albicans, Trichophyton mentagrophytes, Geotrichum candi-

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dans, *Monilia sitophila*, *Scenedesmus quadricauda*, *Chlorella vulgaris*, *Nostoc muscorium*, *Oscillatoria limosa* and *Anabaena constricta*.

5 The novel substances can be converted into conventional formulations such as solutions, emulsions, suspensions, dusts, powders, pastes and granules. The application forms depend entirely on the purposes for which they are intended; they should at all events ensure a fine and uniform distribution of the active ingredient.

10 The formulations are produced in known manner, for example by extending the active ingredient with solvents and/or carriers, with or without the use of emulsifiers and dispersants; if water is used as solvent, it is also possible to employ other organic solvents as auxiliary solvents. Suitable auxiliaries for this

15 purpose are solvents such as aromatics (e.g., xylene), chlorinated aromatics (e.g., chlorobenzenes), paraffins (e.g., crude oil fractions), alcohols (e.g., methanol, butanol), ketones (e.g., cyclohexanone), amines (e.g., ethanolamine, dimethylformamide), and water; carriers such as ground natural-minerals (e.g.,

20 kaolins, aluminas, talc and chalk) and ground synthetic minerals (e.g., highly disperse silica and silicates); emulsifiers such as nonionic and anionic emulsifiers (e.g., polyoxyethylene fatty alcohol ethers, alkyl sulfonates and aryl sulfonates); and dispersants such as lignin-sulfite waste liquors and methylcellulose.

25

The fungicides generally contain from 0.1 to 95, and preferably from 0.5 to 90, wt% of active ingredient. The active ingredients are used in a purity of from 90 to 100, and preferably from 95 to

30 100, % (according to the NMR/HPLC/GC spectrum).

Usual application concentrations are - based on the weight of the material to be protected - from 0.001 to 5, and preferably from 0.01 to 2, wt% of active ingredient; when the active ingredients

35 are used for treating water, in oil production, in drilling and cutting oils, fuels, in swimming baths, cooling towers, air moistening units or in the paper industry, amounts of from 5 to 500 ppm are sufficient. Ready-to-use disinfectant solutions contain for instance from 0.5 to 10wt% of active ingredient.

40

Examples of such formulations are given below:

I. A solution of 90 parts by weight of compound no. 3 and 10 parts by weight of N-methyl- $\alpha$ -pyrrolidone, which is suitable for

45 application in the form of very fine drops.

II. A mixture of 20 parts by weight of compound no. 4, 80 parts by weight of xylene, 10 parts by weight of the adduct of 8 to 10 moles of ethylene oxide and 1 mole of oleic acid-N-monoethanolamide, 5 parts by weight of the calcium salt of dodecylbenzenesulfonic acid, and 5 parts by weight of the adduct of 40 moles of ethylene oxide and 1 mole of castor oil. By finely dispersing the mixture in 100,000 parts by weight of water, an aqueous dispersion is obtained.

10 III. An aqueous dispersion of 20 parts by weight of compound no. 1, 40 parts by weight of cyclohexanone, 30 parts by weight of isobutanol, 20 parts by weight of the adduct of 40 moles of ethylene oxide and 1 mole of castor oil. A mixture of this dispersion with 100,000 parts by weight of water contains 0.02wt% of  
15 the active ingredient.

IV. An aqueous dispersion of 20 parts by weight of compound no. 3, 25 parts by weight of cyclohexanol, 65 parts by weight of a mineral oil fraction having a boiling point between 210 and 280°C,  
20 and 10 parts by weight of the adduct of 40 moles of ethylene oxide and 1 mole of castor oil. The mixture of this dispersion with 100,000 parts by weight of water contains 0.02wt% of the active ingredient.

25 V. A hammer-milled mixture of 80 parts by weight of compound no. 2, 3 parts by weight of the sodium salt of diisobutylnaphthalene- $\alpha$ -sulfonic acid, 10 parts by weight of the sodium salt of a lignin-sulfonic acid obtained from a sulfite waste liquor, and 7 parts by weight of powdered silica gel. By finely dispersing the  
30 mixture in 20,000 parts by weight of water, a spray liquor containing 0.1wt% of the active ingredient is obtained.

VI. An intimate mixture of 3 parts by weight of compound no. 1 and 97 parts by weight of particulate kaolin. The dust contains  
35 3wt% of the active ingredient.

VII. An intimate mixture of 30 parts by weight of compound no. 4, 92 parts by weight of powdered silica gel and 8 parts by weight of paraffin oil sprayed onto the surface of this silica  
40 gel. This formulation of the active ingredient exhibits good adherence.

VIII. A stable aqueous dispersion of 40 parts by weight of compound no. 2, 10 parts of the sodium salt of a phenolsulfonic acid-urea-formaldehyde condensate, 2 parts of silica gel and 48 parts of water, which dispersion can be further diluted.

IX. A stable oily dispersion of 20 parts by weight of compound no. 3, 2 parts by weight of the calcium salt of dodecylbenzenesulfonic acid, 8 parts by weight of a fatty alcohol polyglycol ether, 2 parts by weight of the sodium salt of a phenolsulfonic acid-urea-formaldehyde condensate and 68 parts by weight of a paraffinic mineral oil.

X. A hammer-milled mixture of 10 parts by weight of compound no. 1, 4 parts by weight of the sodium salt of diisobutylnaphthalene-  
10  $\alpha$ -sulfonic acid, 20 parts by weight of the sodium salt of a lignin-sulfonic acid obtained from a sulfite waste liquor, 38 parts by weight of silica gel, and 38 parts by weight of kaolin. By finely dispersing the mixture in 10,000 parts by weight of water, a spray liquor containing 0.1wt% of the active ingredient  
15 is obtained.

Used alone, the active ingredients act as low-foaming biocides. A significant increase in the action of biocidal formulations containing these compounds is achieved if tri-C<sub>6</sub>- to C<sub>12</sub>-alkylmethy-  
20 ammonium salts, preferably in amounts of from 20 to 40wt%, based on the weight of compounds of the general formula I, are added.

The active ingredients may also be mixed with other, prior art, microbicides. In many instances, a synergistic effect is  
25 achieved, i.e., the microbical action of the mixture is greater than the added actions of its individual components.

Prior art microbicides may be added to the novel substances in a weight ratio of from 1:100 to 100:1.

30

Examples of such active ingredients are as follows:

2-(thiocyanomethylthio)-benzothiazole  
1-[2-(2,4-dichlorophenyl)-2-(2-propenylloxy)-ethyl]-1H-imidazole  
35 2,4,5,6-tetrachloroisophthalodinitrile  
methylene bisthiocyanate  
tributyltin oxide, naphthenate, benzoate, salicylate  
mercaptobenzothiazole  
1,2-benzisothiazolone and its alkali metal salts  
40 alkali metal compounds of N'-hydroxy-N-cyclohexyldiazenium oxide  
2-(methoxycarbonylamino)-benzimidazole  
2-methyl-3-oxo-5-chlorothiazolin-3-one  
trihydroxymethylnitromethane  
glutardialdehyde  
45 chloroacetamide  
polyhexamethylene bisguanide  
5-chloro-2-methyl-4-isothiazolin-3-one + magnesium salts

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3,5-dimethyltetrahydro-1,3,5-2H-thiadiazine-2-thione  
hexahydrotriazine  
N,N-methylolchloroacetamide  
2-n-octyl-4-isothiazolin-3-one

5 oxazolidines  
bioxazolidines  
2,5-dihydro-2,5-dialkoxy-2,5-dialkylfurans  
diethyldecylbenzylammonium chloride  
dimethyloctadecylmethyldimethylbenzylammonium chloride

10 dimethyldidecylammonium chloride  
dimethyldodecylammonium chloride  
trimethyltetradecylammonium chloride  
benzyldimethylalkyl-(C<sub>12</sub>-C<sub>18</sub>)-ammonium chloride  
dichlorobenzyldimethyldecylammonium chloride

15 cetylpyridinium chloride  
cetylpyridinium bromide  
cetyltrimethylammonium chloride  
laurylpyridinium chloride  
laurylpyridinium bisulfate

20 benzyldodecyl(beta-oxyethyl)-ammonium chloride  
dodecylbenzyltrimethylammonium chloride  
n-alkyldimethylbenzylammonium chloride  
(alkyl radical: 40% C<sub>12</sub>, 50% C<sub>14</sub>, 10% C<sub>16</sub>)  
lauryldimethylethylammonium ethyl sulfate

25 n-alkyldimethyl-(1-naphthylmethyl)-ammonium chloride  
(alkyl radical: 98% C<sub>12</sub>, 2% C<sub>14</sub>)  
cetyltrimethylbenzylammonium chloride  
lauryldimethylbenzylammonium chloride

30 Examples of further compounds which may be admixed are:

1,3-dimethylol-5,5-dimethylhydantoin  
dimethylolurea  
tetramethylolacetylenediurea

35 dimethylolglyoxalmonoureine  
hexamethylenetetramine  
glyoxal  
glutaraldehyde  
N-methylolchloroacetamide

40 1-(hydroxymethyl)-5,5-dimethylhydantoin  
1,3-bis-(hydroxymethyl)-5,5-dimethylhydantoin  
imidazolidinylurea  
1-(3-chloroallyl)-3,5,7-triaza-1-azonia-adamantan chloride  
1,3-bis-(β-ethylhexyl)-5-methyl-5-amino-hexahydropyrimidine

45 1,3,5-tris-(hydroxyethyl)-1,3,5-hexahydrotriazine  
1,2-dibromo-2,4-dicyanobutane  
5-bromo-5-nitro-1,3-dioxane

2-bromo-2-nitropropanediol  
 1,1'-hexamethylene-bis-[5-(4-chlorophenyl)-biguanide]  
 4,4-diaminodiphenoxypyropane  
 2-bromo-2-nitropropane-1,3-diol  
 5 sorbic acid and its salts  
 p-hydroxybenzoic acid and its esters and salts  
 zinc-2-pyridinethiol-N-oxide  
 2-[(hydroxymethyl)amino]-ethanol  
 dithio-2,2'-bis(benzmethylamide)  
 10 5-chloro-2-(2,4-dichlorophenoxy)-phenol  
 thio-bis-(4-chlorophenol)  
 o-phenylphenol  
 chloromethyl-diiodomethylsulfone  
 p-chlorophenyl-3-iodopropargylformal.

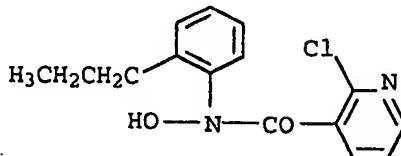
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Synthesis examples

The directions given in the synthesis examples below were used, after appropriate modification of the starting materials, to obtain further compounds I. The compounds thus obtained are listed in the tables below with their physical data.

1. N-hydroxy-N-(2-propylphenyl)-2-chloronicotinamide

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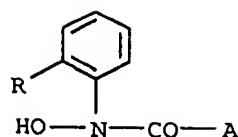
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At 0°C, 14 ml of water and 19.6 g of sodium bicarbonate are added to a solution of 15.1 g of 2-n-propylphenylhydroxylamine in 75 ml of a 2:1 mixture of ether and ligroin, and 13.6 g of 2-chloronicotinamide is then dripped in while stirring vigorously. The mixture is stirred overnight at room temperature and then suction filtered. The residue is stirred for 15 minutes in 10% strength sodium bicarbonate solution, suction filtered, dissolved in ethyl acetate and dried, and the solvent is evaporated off under reduced pressure. From the crude product (14.6 g) there is isolated, after recrystallization from ethanol, 12.5 g of 2-chloronicotic acid-N-hydroxy-2-n-propylanilide of m.p. 134-135°C.

45

Table 1

5



10	Example no.	R	A	Phys. data
1	CH(CH <sub>3</sub> ) <sub>2</sub>	2-Cl-pyridin-3-yl	107-111°C	
2	CH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>	2-Cl-pyridin-3-yl	134-135°C	
3	CH <sub>2</sub> CH(CH <sub>3</sub> ) <sub>2</sub>	2-Cl-pyridin-3-yl	oil	
15	4	phenyl	2-Cl-pyridin-3-yl	112-115°C
5	CH <sub>2</sub> CH(CH <sub>3</sub> ) <sub>2</sub>	2-CH <sub>3</sub> , 4-CF <sub>3</sub> -thiazol-4-yl	oil	
6	phenyl	2-CH <sub>3</sub> , 4-CF <sub>3</sub> -thiazol-4-yl	173-175°C	
7	CH <sub>2</sub> CH(CH <sub>3</sub> ) <sub>2</sub>	2,4-(CH <sub>3</sub> ) <sub>2</sub> -thiazol-4-yl	oil	
20	8	phenyl	2,4-(CH <sub>3</sub> ) <sub>2</sub> -thiazol-4-yl	58-62°C

Examples demonstrating biological action:

25 Action on *Botrytis cinerea*

Slices of green paprika pods were sprayed to runoff with aqueous suspensions containing (dry basis) 80% of the active ingredient and 20% of emulsifier. After the sprayed-on layer had dried, the slices were sprayed with a spore suspension [1.7·10<sup>6</sup> spores per 30 ml; 2% biomalt; water] of the fungus *Botrytis cinerea* and then kept for 4 days at 18°C and in high humidity.

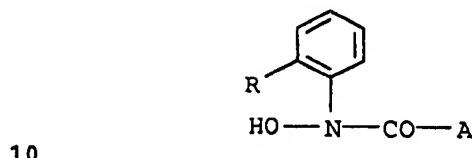
After this period, the untreated controls exhibited 90% fungus attack, whereas the paprika slices treated with 500 ppm of compound nos. 1 and 2 exhibited 5% attack at most.

At an application rate of 1000 ppm of compounds nos. 1 and 2 the paprika slices exhibited no attack at all, whereas the slices treated with 1000 ppm of 2-chloronicotinic acid-2-chloroanilide exhibited 90% attack, just as the untreated controls.

We claim:

1. N-Hydroxy-N-phenylcarboxamides of the formula I

5



I

where:

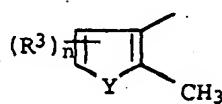
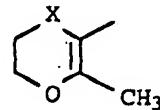
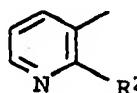
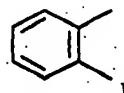
15 R is  $C_2$ - $C_{12}$ -alkyl,  $C_2$ - $C_{12}$ -alkoxy,  $C_3$ - $C_{12}$ -alkenyl,  $C_3$ - $C_{12}$ -alkenyloxy,  $C_3$ - $C_6$ -alkynyl or  $C_3$ - $C_6$ -alkynyoxy, where these groups are partially or completely halogenated;

20  $C_3$ - $C_7$ -cycloalkyl,  $C_4$ - $C_7$ -cycloalkenyl,  $C_3$ - $C_7$ -cycloalkyloxy or  $C_4$ - $C_7$ -cycloalkenyloxy, where these rings may bear from one to three  $C_1$ - $C_4$ -alkyl groups;

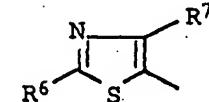
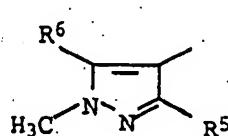
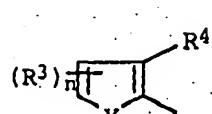
25 phenyl, which may bear from one to five halogen atoms and/or from one to three of the following radicals:  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy,  $C_1$ - $C_4$ -haloalkoxy,  $C_1$ - $C_4$ -alkylthio or  $C_1$ - $C_4$ -haloalkylthio;

30 A is a cyclic radical selected from the group of formulae A1 to A7

30



35



40

45 where:

X is  $-\text{CH}_2-$ ,  $-\text{S}-$ ,  $-\text{SO}-$  or  $-\text{SO}_2-$ ;

Y is  $-\text{O}-$  or  $-\text{S}-$ ;

R<sup>1</sup>, R<sup>2</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>7</sup> are halogen, C<sub>1</sub>-C<sub>4</sub>-alkyl or C<sub>1</sub>-C<sub>4</sub>-halo-alkyl;

5 R<sup>3</sup> and R<sup>6</sup> are hydrogen, halogen or C<sub>1</sub>-C<sub>4</sub>-alkyl;

n is 1 or 2, and the radicals R<sup>3</sup> may be different when n is 2.

2. N-Hydroxy-N-phenylcarboxamides of the formula I as claimed in

10 claim 1, where R has the meanings given in claim 1 and A is a cyclic radical selected from the group having the formulae A1 to A7, where X and Y have the meanings given in claim 1 and the substituents have the following meanings:

15 R<sup>1</sup> is halogen, methyl or C<sub>1</sub>-haloalkyl;

R<sup>2</sup> is halogen or C<sub>1</sub>-haloalkyl;

R<sup>3</sup> is hydrogen or methyl;

n is 1 or 2, and the radicals R<sup>3</sup> may be different when n is 2;

20 R<sup>4</sup> is halogen or methyl;

R<sup>5</sup> is methyl or C<sub>1</sub>-haloalkyl;

R<sup>6</sup> is hydrogen, halogen or methyl;

R<sup>7</sup> is halogen, methyl or C<sub>1</sub>-haloalkyl.

25 3. N-Hydroxy-N-phenylcarboxamides of the formula I as claimed in

claim 1, where R has the meanings given in claim 1 and A is a cyclic radical selected from the group having the formulae A1 to A7, where X and Y have the meanings given in claim 1 and the substituents have the following meanings:

30 R<sup>1</sup> is chloro, bromo, iodo, methyl or trifluoromethyl;

R<sup>2</sup> is chloro or trifluoromethyl;

R<sup>3</sup> is hydrogen or methyl;

n is 1 or 2, and the radicals R<sup>3</sup> may be different when n is 2;

35 R<sup>4</sup> is chloro or methyl;

R<sup>5</sup> is methyl, difluoromethyl or trifluoromethyl;

R<sup>6</sup> is hydrogen, chloro or methyl;

R<sup>7</sup> is chloro, methyl or trifluoromethyl.

40

4. An agent for combatting injurious fungi, containing a fungicidal amount of a compound of the formula I as claimed in claim 1, 2 or 3, and inert additives.

5. A process for combatting injurious fungi, wherein the fungi, their habitat and/or the plants or materials to be kept free from fungi are treated with a fungicidally effective amount of a compound of the formula I as claimed in claim 1, 2 or 3.
6. The use of compounds I as claimed in claim 1, 2 or 3 for combatting injurious fungi.
7. The use of compounds I as claimed in claim 1, 2 or 3 for combatting Botrytis.

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